

We claim:

- 1 1. A stacked MCM package comprising a substrate, a digital MCM, and an RF  
2 MCM all electrically interconnected one on top of another.
- 1 2. A stacked MCM package comprising:
  - 2 a. a system substrate;
  - 3 b. a digital MCM on a digital MCM substrate;
  - 4 c. an RF MCM on an RF MCM substrate;
  - 5 d. a first solder bump array connecting the digital MCM substrate to the  
6 system substrate;
  - 7 e. a second solder bump array connecting the RF MCM substrate to the  
8 digital MCM substrate;
  - 9 f. a through hole interconnection through the digital MCM substrate  
10 electrically connecting an electrical node on the system substrate to an  
11 active electrical node on the RF MCM substrate exclusive of any electrical  
12 connection to an active electrical node on the digital MCM substrate.
- 1 3. A stacked MCM package comprising:
  - 2 a. a system substrate;
  - 3 b. a digital MCM on a digital MCM substrate;
  - 4 c. an RF MCM on an RF MCM substrate;

5 d. a first solder bump array connecting the RF MCM substrate to the  
6 system substrate;  
7 e. a second solder bump array connecting the digital MCM substrate to  
8 the RF MCM substrate;  
9 f. a through hole interconnection through the RF MCM substrate  
10 electrically connecting an electrical node on the system substrate to an  
11 active electrical node on the digital MCM substrate exclusive of any  
12 electrical connection to an active electrical node on the RF MCM  
13 substrate.

1 4. The stacked MCM package of claim 2 wherein the through hole  
2 interconnection comprises a solder bump of the first solder bump array and a  
3 solder bump of the second solder bump array.

1 5. The stacked MCM package of claim 3 wherein the through hole  
2 interconnection comprises a solder bump of the first solder bump array and a  
3 solder bump of the second solder bump array.

1 6. The stacked MCM package of claim 2 wherein the through hole  
2 interconnection from the system substrate to the RF MCM substrate is a ground  
3 connection.

1 7. The stacked MCM package of claim 2 wherein the through hole

interconnection from the system substrate to the RF MCM substrate is an RF input connection.

8. The stacked MCM package of claim 7 wherein the RF input connection is connected to an RF antenna.

9. The stacked MCM package of claim 2 wherein the through hole interconnection from the system substrate to the RF MCM substrate is a ground connection and the stacked MCM package comprises an additional through hole interconnection through the digital MCM substrate electrically connecting an electrical node on the system substrate to an active electrical node on the RF MCM substrate exclusive of any electrical connection to an active electrical node on the digital MCM substrate, and wherein the additional through hole interconnection from the system substrate to the RF MCM substrate is an RF input connection.

10. A stacked MCM package comprising:

- a. a system substrate;
- b. an RF MCM on an RF MCM substrate;
- c. a digital MCM on a digital MCM substrate;
- d. a first solder bump array connecting the RF MCM substrate to the system substrate, and wherein at least one of the first solder bump array is an RF solder bump conductor;

- e. a second solder bump array connecting the digital MCM substrate to the RF MCM substrate;
- f. a Faraday cage around the RF solder bump conductor.

11. The stacked MCM package of claim 10 wherein the Faraday cage comprises at least three solder bumps arranged around the RF solder bump conductor, with the at least three solder bumps of the Faraday cage connected to a common ground.

12. The stacked MCM package of claim 11 wherein the common ground is the ground for the RF MCM.

13. A stacked MCM package comprising:

- a. a system substrate;
- b. a digital MCM on a digital MCM substrate;
- c. an RF MCM on an RF MCM substrate;
- d. a first solder bump array connecting the digital MCM substrate to the system substrate;
- e. a second solder bump array connecting the RF MCM substrate to the digital MCM substrate;
- f. a through hole interconnection through the digital MCM substrate electrically connecting an electrical node on the system substrate to an active electrical node on the RF MCM substrate exclusive of any electrical

12 connection to an active electrical node on the digital MCM substrate, the  
 13 through hole interconnection comprising at least two RF solder bump  
 14 conductors, one selected from the first solder bump array and one  
 15 selected from the second solder bump array; and further wherein the  
 16 through hole interconnection is an RF input connection;  
 17 g. a Faraday cage surrounding at least one of the at least two RF solder  
 18 bump conductors.

1 14. The stacked MCM package of claim 13 wherein the Faraday cage  
 2 comprises at least three solder bumps connected to a common ground.

1 15. The stacked MCM package of claim 13 wherein a Faraday cage surrounds  
 2 both of the at least two RF solder bump conductors.

1 16. The stacked MCM package of claim 13 wherein the stacked MCM package  
 2 comprises an additional through hole interconnection through the digital MCM  
 3 substrate electrically connecting an electrical node on the system substrate to an  
 4 active electrical node on the RF MCM substrate exclusive of any electrical  
 5 connection to an active electrical node on the digital MCM substrate, and  
 6 wherein the additional through hole interconnection from the system substrate to  
 7 the RF MCM substrate is an RF ground connection.

1 17. The stacked MCM package of claim 2 wherein the digital MCM comprises a

2 two sided digital MCM substrate with IC chips mounted on both sides of the  
3 digital MCM substrate.

1 18. The stacked MCM package of claim 3 wherein the digital MCM comprises a  
2 two sided digital MCM substrate with IC chips mounted on both sides of the  
3 digital MCM substrate.

1 19. A stacked MCM package comprising a substrate, a digital MCM, and an RF  
2 MCM all electrically interconnected one on top of another by means of solder  
3 bumps, and at least one of the solder bumps is connected to the RF MCM and is  
4 surrounded by an array of at least three solder bumps electrically connected to a  
5 common ground.

1 20. The stacked MCM package of claim 19 wherein the common ground is the  
2 ground for the RF MCM.

1 21. A stacked MCM package comprising a substrate, a digital MCM, and an RF  
2 MCM all electrically interconnected one on top of another by means of solder  
3 bumps, a first ground connection to the digital MCM, a second ground  
4 connection to the RF MCM, the first and second ground connections being  
5 electrically isolated.